CLAIMS

We claim:

1. A method for administering hydro-acoustic therapy to a patient, said method comprising:

providing a chamber, said chamber having a volume of liquid;

placing the patient in said chamber such that a portion of the patient is immersed in the liquid; and

propagating low frequency acoustic waves through the liquid, such that said acoustic waves mobilize respiratory secretions in lungs of said patient.

2. The method of claim 1, wherein liquid comprises water.

3. The method of claim 2, wherein the step of placing comprises immersing the patient in said water such that a lung of the patient is fully submersed in said water.

4. The method of claim 2, wherein the step of propagating further comprises causing said frequency and an amplitude of said acoustic waves to vary as a function of time.

5. The method of claim 3, wherein said volume of water has a minimum mass of about three times a displaced mass of said lung of the patient.

6. The method of claim 3, wherein said acoustic waves have a frequency below about 120 Hertz.

7. The method of claim 6, wherein said introducing step comprises uniformly stimulating said lung by causing said lung to oscillate at a resonant frequency of said lung.

8. The method of claim 7, wherein said patient is afflicted with cystic fibrosis.

9. The method of claim 7, wherein said patient is afflicted with chronic obstructive lung disease.

10. The method of claim 7, wherein said patient is afflicted with lung cancer.

11. The method of claim 7, wherein said patient is afflicted with pneumonia.

12. A method for the medical treatment of a person, said method comprising:

providing a chamber containing a fluid;

placing a person in said chamber such that a body of the person is immersed in said fluid; and

introducing acoustic vibrations into said fluid, said vibrations causing the mobilization of respiratory secretions in said person.

13. The method of claim 12, wherein said fluid comprises water.

14. The method of claim 13, wherein said placing step comprises immersing the person in said fluid such that a body of the person is fully immersed in said fluid below a neck area of the person.

15. The method of claim 13, wherein said acoustic vibrations are low frequency vibrations.

16. The method of claim 13, wherein the step of propagating further comprises causing said frequency and an amplitude of said acoustic waves to vary as a function of time.

17. The method of claim 15, wherein said acoustic vibrations are below 120 Hertz.

18. The method of claim 17, wherein said acoustic vibrations cause a lung of the person to oscillate at the fundamental resonance frequency of said lung.

19. The method of claim 14, further comprising the steps of:

determining a resonance frequency of a lung of said person; and

causing said acoustic vibrations to operate at said resonance frequency of said lung.

20. The method of claim 14, further comprising the step of positioning a monitoring device near a chest area of the person such that an effect of said acoustic vibrations on the person is monitored.

21. The method of claim 20, wherein said monitoring device comprises a hydrophone.

22. A method for determining a resonant frequency of lungs of a patient, comprising the steps of:

providing a chamber containing a fluid;

placing a hydrophone in said chamber;

causing acoustic vibrations at a first frequency and changing a frequency of said acoustic vibrations to a second frequency;

recording a first output of said hydrophone as said acoustic vibration frequency is increased;

computing a first transfer function of said first output;

placing a person in said chamber such that a body of the person is immersed in said fluid;

positioning said hydrophone near a chest area of the person;

causing acoustic vibrations at said first frequency and changing said frequency of said acoustic vibrations to said second frequency;

recording a second output of said hydrophone as said acoustic vibration frequency is increased;

computing a second transfer function of said second output;

plotting a ratio of said first transfer function to said second transfer function versus said frequency of said acoustic vibrations; and

identifying a maximum of said plot as a resonant frequency of said lung.

23. An apparatus for administering hydro-acoustic therapy for a patient, said device comprising:

a chamber having walls, said chamber having a volume of a fluid; and

an acoustic generator that generating acoustic waves in said fluid of said chamber, wherein said acoustic waves are low frequency vibrations.

24. The apparatus of claim 23, further comprising a supporting structure for permitting a person to sit in the chamber, partially submersed in said fluid, during treatment.

25. The apparatus of claim 24, further comprising a hydrophone positioned near a chest of said person in said fluid, said hydrophone for monitoring a response of said person to said acoustic waves.

26. The apparatus of claim 23, wherein said fluid comprises water.

27. The apparatus of claim 26, wherein said chamber walls are rigid and define a generally cylindrical chamber.

28. The apparatus of claim 27, wherein said chamber further comprises an orifice in a wall, wherein said orifice is covered by a flexible membrane.

29. The apparatus of claim 28, wherein said acoustic generator comprises a means for causing said membrane to oscillate in periodic motion.

30. The apparatus of claim 29, wherein said causing means comprises a piston outside of said chamber and directed to press against said membrane in order to cause said periodic motion.